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EXAMINER

WILKINS III, HARRY D

ART UNIT PAPER NUMBER

1742

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Please find below and/or attached an Office communication concerning this application or proceeding.



## **DETAILED ACTION**

### ***Status***

1. The prior rejection grounds based on Young et al alone have been withdrawn in view of the fact that the Eltech ALE® anode of Young et al was not a flow-through electrode. Applicant's amendment to claim 1 necessitated this new rejection ground, however, the amendments to claim 18 did not. Therefore, in view of the entry of new rejection grounds for claim 18 not necessitated by amendment, this rejection is not made final.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-5, 8-14, 18 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Young et al (US 5,622,615) in view of Goens et al (US 3,972,795).

Young et al teach (see figure 1 and example 7) a method of electrowinning copper including providing an electrolytic cell (4) containing at least one anode and at least one cathode, wherein the cathode has an "active" surface area, providing a flow of electrolyte through the electrolytic cell, the electrolyte including copper and solubilized ferrous iron, oxidizing at least a portion of the ferrous ions to ferric ions at the anode, removing (plating) at least a portion of the copper at the cathode and operating the cell at a voltage below 1.5 V and a current density greater than 26 A/ft<sup>2</sup> (~280 A/m<sup>2</sup>).

Young et al do not teach utilizing a flow-through anode.

Goens et al teach (see abstract, figures and cols. 2-3 and 7-8) a method of electrowinning copper including providing an electrolytic cell with flow-through anodes and cathodes, providing a flow of electrolyte through the cell, the electrolyte including copper and solubilized ferrous iron and removing at least a portion of the copper from the electrolyte at the at least one cathode. The flow-through cell was capable of higher efficiency than an electrowinning cell using non-flow-through electrodes.

Therefore, it would have been obvious to one of ordinary skill in the art to have performed the process of Young et al in the flow-through cell of Goens et al because Goens et al teach that the flow-through cell provided increases in copper electrowinning efficiency.

Regarding claims 4-5, the disclosed voltage of Young et al can be as low as 1.03 Volts (which is less than about 1.0 Volts).

Regarding claims 6, 7 and 19, Young et al teach varying the flowrate of the electrolyte (see example 6) and describes it as a result effective variable. Therefore, it would have been obvious to one of ordinary skill in the art to have optimized the flow rate of the electrolyte in the electrolytic cell.

Regarding claims 8-9, Young et al teach (see col. 9, lines 28-39) using electrocatalyst coated titanium as the anode. Thus, the flow-through anode in the cell of Goens et al would have been made with the electrocatalytic coating and have performed the oxidizing of the ferrous iron.

Regarding claims 10-11, the electrolyte of Young et al contained 35 g/L Fe.

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Regarding claims 12-14, the disclosed temperature of Young et al is 80°C (176°F). The range of temperatures disclosed by Young et al included 60°C (140°F)

Regarding claim 18, Young et al teach (see example 7) the process of electrowinning copper wherein circulation is used so that operation of the cell occurs at a voltage less than 1.5 Volts and at a current density of more than 26 A/ft<sup>2</sup>. Goens et al provide the suggestion to use flow-through electrodes in order to enhance the efficiency of the copper electrowinning process.

Regarding claim 20, it would have been obvious to one of ordinary skill in the art to have facilitated the electrolyte circulation by using a flow manifold because a flow manifold would have allowed easy distribution of the electrolyte to multiple cells simultaneously, thereby increasing productivity.

Regarding claim 21, it would have been obvious to one of ordinary skill in the art to have provided the flow of electrolyte into and through the flow through anode in order to allow the electrolyte to react with the anode to oxidize the ferrous ions to ferric ions before the electrolyte reached the cathode to avoid the ferrous ions interacting at the cathode.

4. Claims 15-17 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Young et al (US 5,622,615) in view of Goens et al (US 3,972,795) as applied to claims 1 and 18 above, and further in view of Sandoval et al (US 5,492,608).

The teachings of Young et al and Goens et al are described above.

However, Young et al do not teach a recycling of electrolyte wherein at least a portion of the ferric ions are reduced back to ferrous ions to form a regenerated electrolyte.

Sandoval et al teach (see col. 7, lines 27-37) recycling a copper electrowinning electrolyte through activated carbon modules and exposing the electrolyte to sulfur dioxide gas to reduce the ferric ions back to ferrous ions to form a regenerated electrolyte which is fed back to the cell.

Therefore, it would have been obvious to one of ordinary skill in the art to have incorporated the recycle line taught by Sandoval et al in the method of Young et al in order to effectively recycle the electrolyte to reduce waste. The activated carbon acts as a catalyst in the process.

### ***Response to Arguments***

5. Applicant's arguments with respect to claims 1 and 18 have been considered but are moot in view of the new ground(s) of rejection.


### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D. Wilkins, III whose telephone number is 571-272-1251. The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V. King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Harry D Wilkins, III  
Primary Examiner  
Art Unit 1742

hdw